



# **CIGS Roger Pielke, Jr. Seminar**

## **Extreme Weather and Climate Change: Science and Politics (Summary of speech)**

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**Roger Pielke, Jr., Environmental Studies Director, Sports Governance Center  
Faculty Affiliate, Center for Science and Technology Policy Research, University of  
Colorado**

The reality of human-caused climate change, emission reductions, and the carbon challenge will not be the focus of my talk. Instead, I would like to discuss trends in extreme weather events, and the connection between the contributions of increasing wealth and population versus possible changes in weather extremes as contributors to the costs of weather-related disasters. I have had the pleasure of engaging in this field of study for over two decades, and I would like to present to you some personal experiences also.

One of the high points of my career was receiving a Roger Revelle Award from the U.S. National Academy of Sciences (slide 4). Roger Revelle was a Harvard professor who taught Al Gore about climate change. At the time Al Gore's documentary 'An Inconvenient Truth' was released in 2006, the environmental politics in the United States were focused around extreme events rather than being concerned over distant consequences, like the earth will get three degrees warmer in the next 100 years (slide 5). In order to support and promote environmental politics which not only focus on extreme events but also on science, the experts have an obligation to get the science right all the time.

In 2006, along with Peter Hoppe, I helped organize a workshop in which 32 participants from 16 different countries came together to evaluate and analyze climate change and disaster losses (slide 7, slide 9). This is important. One of the things we did for participants is we asked them to prepare white papers, big background papers in order to state their views before they came to the workshop. We had 24 white papers and much to our surprise, we were able to come up with a consensus report. When we started, Peter Hoppe and I thought we would make a dissensus report. We will agree where we disagree, but it turns out that was not necessary because the state of the science was so strong at that time, we were able to come out with a consensus report with 20 statements. Specifically, we wanted to see if there was a connection or signal between human-caused climate change and damage losses due to weather events (slide 10). At that time, we were not able to determine the portion of the increasing damages that might be attributed to climate change with greenhouse gas emissions. What this says is that when we look at the increasing costs at the time, if there was a signal of climate change, we could not see it; we could not find it. This is possibly due to the fact that extreme events are rare and data is poor. The Intergovernmental Panel on Climate Change (IPCC) stated that once we adjust for societal changes, such as more wealth and

property, the losses are still going up. One study has found that while the dominant signal remains that of the significant increases in the values of exposure at risk, once losses are normalized for exposure, there still remains an underlying rising trend (slide 12 - 14). Basically, Robert Muir-Wood created the graph showing the increase in losses and intentionally mis-cited it in order to get around the IPCC deadline for inclusion of published material. The graph was from a paper he was working on that was going to appear after the IPCC report came out. That graph should have never been included in the report. Finally, when the graph was published in its intended article, “We find insufficient evidence to claim a statistical relationship between global temperature increase and normalized catastrophe losses” was stated by the author and co-authors of the article. Robert Muir-Wood was a co-author of that article (slides 16 – 17). When that paper was published, it said the exact opposite of what the IPCC stated, even though they both used the same graph. After an interview with Foreign Policy Magazine, I was accused of being a climate change denier because of this statement, “We cannot make a causal link between increase in greenhouse gases and the costs of damage associated with hurricanes, floods, and extreme weather phenomena.” It was claimed that this statements went against certain graphs presented in IPCC reports (slide 18).

Later, in 2012, the IPCC stated, “Long-term trends in economic disaster losses adjusted for wealth and population increases have not been attributed to climate change, but a role for climate change has not been excluded (medium evidence, high agreement)” (slide 19). I had the privilege of testifying a very similar testimony about climate change and extreme events before the House of Representatives and the Senate (slide 20). Six months after my testimony, John Holdren, who was President Obama’s science advisor, testified before the same committee as I did (slide 21). He stated some things about climate change and extreme events that were not completely in line with the IPCC and myself. In turn, John Holdren was asked to “answer some questions” for the Senate, and he ended up producing a six-page report titled ‘A Response to Roger Pielke’ and published it on the White House website (slide 22). Less than a year later, a member of Congress investigated it and concluded that I must be taking money from Exxon because I publicly stated such strange views about climate change (slide 23 – 24).

My motivation for writing my short book came from President Barack Obama when, on June 29, 2013, he stated, “While we know no single weather event is caused solely by climate change, we also know that in a world that’s getting warmer than it used to be, all weather events are affected by it – more extreme droughts, floods, wildfires, and hurricanes. And, Americans across the country are already paying the price of inaction in higher food costs, insurance premiums, and the tab for rebuilding (slide 27).” This motivated me because it was wrong, and I did not want to keep quiet. Jim Inhofe, the

leading climate denier for Republicans, brought a snowball into the Senate and said, “If it is global warming, how can I have a snowball (slide 28)?” Everyone plays politics, and my view is that as researchers we should not favor one side or the other, we just tell it as we see it.

Referencing four major climate assessment reports on climate phenomena, the evidence suggests there has been an increase in the intensity and frequency, but it is not completely 100% certain (slide 29 – 31). One question which we are asking about hurricanes is, if all hurricanes of the past hit the United States with today’s society conditions (buildings, infrastructure, etc.), how much damage would occur? After observing graphs of hurricane damage costs, we realized that there is no trend. We cannot use economic data to see climate trends (slide 32). If you look at hurricanes in the North Atlantic through the ones that strike the United States, those events are responsible for about 60% of the overall damage in the Munich Reinsurance dataset. They say it is a global dataset of losses, but it is dominated by U.S. hurricanes. With no upwards trends in hurricane landfall frequency or intensity, there is no reason to expect to see an upwards trend in normalized losses (slide 33 - 36).

Regarding hurricane-related flooding, there is no statistically significant trends in magnitude or frequency of tropical cyclone floods in the United States (slide 37). There continues to be a lack of evidence and low confidence regarding the sign of trends in the magnitude and/or frequency of floods on a global scale (slide 39). A peer-reviewed paper was written by the coauthors of the IPCC Special Report on Extreme Events (SREX) in which they summarized their perspective on floods. It stated, “A direct statistical link between anthropogenic climate change and trends in the magnitude/frequency of floods has not been established” (slide 40 - 41). There is such a focus to link climate change and greenhouse gases to floods even though we already know for certain about floods, and how to mitigate and adapt to them. In the United States and Europe, there is a sharp decline in flood damage as a proportion of Gross Domestic Product (GDP) (slide 42). The Federal Emergency Management Agency (FEMA), concluded that there has not been a real trend in flood events since 1978, which is when they were first created (slide 43). They also said that there is low confidence in observed trends in small spatial-scale phenomena such as tornadoes and hail (slide 44). For tornadoes, the data is very clear that at least in the last 60 years or so, the United States has been very lucky in the last decade because the average frequency of tornadoes is much lower, and it is clear that it is not getting worse (slide 45 – 47).

Regarding drought, the IPCC SREX reported that there is not enough evidence to support medium or high confidence of attribution of increasing trends to anthropogenic

forcings as a result of observational uncertainties and variable results from region to region. We conclude consistent with SREX that there is low confidence in detection and attribution of changes in drought over global land areas since the mid-20th century (slide 48). In the United States, there have been no trends in drought frequency. From the U.S. National Climate Assessment in 2017, the IPCC Assessment Report 5 (AR5) concluded that, in general, results for the contiguous United States are not as compelling as for global land areas (slide 49 – 50). Cold spells have decreased. Warm spells have increased overall. There has been no present trend in heat waves (slide 52). Considering hurricanes, tornadoes, and winter storms, there is still low confidence in long-term increases in activity, challenges in quantifying the existence and intensity of these events due to data sources, and analysis of storm tracks indicates there has been an increase in frequency and intensity since 1950, respectively (slide 52). IPCC AR5 did not attribute changes in flooding to anthropogenic influence nor report detectable changes in flooding magnitude, duration, or frequency. A number of precipitation metrics over the continental United States has been examined; however, trends identified for the U.S. regions have not been clearly attributed to anthropogenic forcing. There is a very robust scientific consensus about drought, flooding, and precipitation in the United States, and it should not be controversial. Have disasters become costlier because of human-caused climate change? There is one answer to this question that is strongly supported by available data, broad scientific literature, and assessments by the IPCC and the U.S. National Climate Assessment. The answer is no. There is very low evidence to support claims that disasters have become costlier due to human-caused climate change (slide 53 - 54).

Back to my story, when the politically motivated campaign to attack my credibility was revealed, my university, the regents, and Democrats and Republicans issued a unanimous statement in support of my academic freedom (slide 55).

The fact that we are doing a poor job on the carbon issue is the reason why I think extreme events have become so politicized. It is easier to fight about what people say and let you think that hurricane Harvey was climate change or not than it is to actually tackle the really hard problems. We need to go from 14% global energy consumption from carbon-free sources to 90% within the century, which is incredibly difficult (slide 57 - 58). In order to keep the carbon emissions at a manageable level, we need to commission a lot of renewable energy and decommission many more fossil fuels than we are doing now. That would be the equivalent of about one to two 1 gigawatt nuclear power plants, 1,500 wind turbines or 14 million solar panels. These have to be deployed every single day between now and 2050 while reducing fossil fuels by the same amount

(slide 58). To my knowledge, there is no large-scale plan to tackle this very difficult part of the climate change challenge.